## BIBLIOGRAPHY

ANGWAY, QUEMMY L. APRIL 2013. Evaluating the Meat of the Broilers Fed with Substituted 50% Commercial Feeds with Varying Levels of Sweet Potato and Corn Grits on the Carcass Yield and Quality of Broilers. Benguet State University, La Trinidad Benguet.

Adviser: Ms. Myrna B. Walsiyen, MSc.

## ABSTRACT

This study was conducted to find out the effect of varying levels of sweet potato and corn grits on the carcass yield and quality of broilers. Specifically, this study aimed to measure and compare the carcass yield of broilers fed with 50% commercial feeds with varying levels of sweet potato and corn grits in terms of slaughter weight, carcass weight and evaluate carcass characteristics through, organoleptic test in terms of appearance aroma, tenderness, juiciness taste, and acceptability.

The result of statistical analysis showed that varying levels of sweet potato and corn grits as substitute for 50% of the commercial ration did not cause any differences on dressing percentage of broilers and quality of meat as evaluated by a taste panel. It is therefore concluded 50% commercial ration can be substituted with varying levels of sweet potato and corn grits.

Statistical analysis showed no significant differences in the dressing percentage of feeds given varying levels of sweet potato and corn grits as substitute to 50% of the commercial ration for broilers. The average dressing percentage of broilers with an average slaughter weight of 1.56 kg. was 75.30%.

# INTRODUCTION

Food is the most important contribution of Agricultural animals to human, that animal contributes a greater percentage of the total food energy. For instance, animals are more important source of protein than they are of calories. In all aspect, of animal product, poultry meat is reach in highly-quality protein and low in total fat and saturated fat. Furthermore, because it is mainly associated with the skin, most poultry fat can be easily removed by removing the skin, in constant greater proportion of the fat in the red meat is found dispersed throughout the lean, making it harder to remove. However, more concern has being focused in poultry meat and it's lower in cholesterol than other meat type.

Nowadays, poultry quality, which is defined by a combination of multiple factors, has become a primary focus for producers, packers, processors, retailers and consumers. Muscle color and texture are always the two most important factors that influence meat quality. The cooked product appearance is significantly associated with raw meat color. Moreover, it is suggested that lightness values could be used as an indicator of poultry breast muscle quality for evaluating the incidence of the PSE- like (pale, soft and exudative) condition. Meat pH, tenderness and water holding capacity are attributes of muscle texture that have been studied most extensively.

Broiler meat is preferred not only for their soft tender quality but also its nutritive value as excellent source of protein. The continuous effort to produce chicken meat has stimulated further research for more suitable combination of known nutrients and new additives to increase the efficiency, rate of growth and level of production of the animals.

This research aimed to produce a reference in the use of different levels of sweet potato and corn grits in improving the carcass quality and the general health of food animals such as broilers. Furthermore, it hopes to promote the use of natural products such as sweet potato and corn grits in improving the carcass quality of broilers.

This study generally aimed to determine the effect of different levels of sweet potato and corn grits on the carcass yield and quality of broiler meat. Specifically, it aimed to determine the quality of carcass produced from broilers fed with different levels of sweet potato and corn grits through organoleptic test and to find out the effect of different levels of sweet potatoes and corn grits on the dressing percentage of broilers under La Trinidad, Benguet.

The experiment used a total of 12 broilers, which was subjected to 42 days feeding period. Meanwhile, carcass evaluation was done at the DAS laboratory in February 2011 and the organoleptic test was done four days after the evaluation.

# REVIEW OF LITERATURE

Sweet potato is deficient in sulfur containing amino acids and tryptophan, but this is partially compensated for by high levels of vitamin A (in a form of beta-carotene), a very good source of vitamin C and manganese, and a good source of copper, dietary fiber, vitamin B6, potassium and iron. Yellow and orange fleshed sweet potato are rich in carotene (Anonymous, 2010)

Besides simple starches, sweet potatoes are rich in complex carbohydrates, dietary fiber, beta carotene, vitamin C, and vitamin B6. Pink and yellow varieties are high in carotene, the precursor of vitamin A. in 1992, the Center for Science in the Public Interest compared the nutritional value of sweet potatoes to other vegetables. Considering fiber content, complex carbohydrates, protein, vitamins A and C, iron and calcium, the sweet potato ranked the highest in nutritional value (Anonymous, 2007).

It has attracted considerable attention over years from an experimental standpoint because sweet potatoes given high yields of digestible carbohydrates. Sweet potatoes will out produce most other crops in yield of digestible carbohydrates per acre. Dried sweet potatoes are high in content of digestible starch and carotene (Perry *et al.,* 2000).

Coma (2000) mentioned that nutrition may have a significant effect on certain attributes of meat quality. Meat quality is a complex without single definition. Fresh meat attributes such color, quality of fats, tenderness, juiciness and flavor are essential in order to drive the purchase and assure consumers fidelity. In addition we must not forget the interrelation with other elements of production process like genetic handling and slaughter.

A poultry carcass should produce highly nutritious value, flavor and texture and eating quality of meat. As a commodity, it has to meet requirements of the costumer in terms of bright and attractive color, characteristics of meat and appearance of the product offered. Also, include the nutritive value, high satiety value, color and especially free from chemical residue. Keeping the bled animal suspended by its hind legs throughout the dressing operations greatly increased the efficiency of converting an animal into a carcass and by products. This new system reduces the chances of microbial contamination (Paris, 1998).

According to Woolfe (1992) maize and sweet potato have comparable metabolizable values of 14.5 to 14.8, respectively. The digestibility of sweet potato carbohydrate fraction is reported to be above 90%. The level of starch decreases with period of storage and instead the level of reducing sugars and total dextrins increases. Sweet potatoes have also been reported to exhibit trypsin inhibitor activity ranging from 20 to 90%. However, trypsin inhibitor levels present in sweet potato tubers are low and should not be a cause for concern under practical situations.

Villareal and Griggs (1982) cited that sweet potato is equal to corn in total digestible nutrients but low in proteins. The average composition of dried sweet potato meal is 90.2% dry matter; 4.9% protein; 0.9% fat; 3.3% fiber; 77.0% nitrogen-free extract; 4.1% minerals; 0.15% calcium and 0.14% phosphorus.

# MATERIALS AND METHODS

## Materials

The different materials that were used are as follows; 12 heads of 45 days old broilers from a growth study that was conducted, knives, containers, weighing scale, digital camera, record book and Ziploc bags.

## Methodology

Experimental birds. The birds were fed with chick booster for the first week and then shifted to broiler starter crumble for the next four weeks. The addition of the dried yellow orange flesh sweet potato and corn grits to the feeds of the birds was on the $28^{th}$ day until $5^{th}$ week. Broiler finisher crumble was given on the fifth week until the end of the study.

Experimental treatments and design. 12 broilers were grouped into four treatments. Each treatment had three replications and each bird represents one replication. The different treatments were as follows:

$T_o$- pure commercial feeds

$T_1$- 500g commercial feeds + 400g corn grits + 100g sweet potato

$T_2$- 500g commercial feeds + 300g corn grits + 200g sweet potato

$T_3$- 500g commercial feeds + 200g corn grits + 300g sweet potato

## Slaughtering of Birds

Prior to dressing, the birds were fasted for 8 hours but water was provided ad libitum. After fasting, the birds were weighed individually after which, these were slaughtered. At slaughtering the bird was secured by holding both shanks with one hand

and both wings with the other hand to prevent struggling of the bird. With the help of an assistant, sticking was done by severing the large blood vessel of the neck at the lateral side below the mandible. After sticking, each bird was immersed into hot water for about a minute or more after which, plucking of feathers followed. After plucking, the bird was washed thoroughly and made it ready for evisceration.

Evisceration was done by laying the bird in dorsal recumbence. The esophagus and wind pipe were then pulled up the base of mandible. For easy insertion of the hand, a slit was made around the vent then down to the keel. The hand was taken inserted into the slit in the abdominal cavity and the abdominal attachment on the entrails. After entrails were pulled out, the liver, heart, and gizzards with proventiculus were separated. The head was detached from the atlanto-occipital joint, which was accomplished by severing the skin, muscle and ligaments at the said joints with a sharp knife.

Carcass Yield Evaluation

The dressed bird was placed on the pan of the weighing scale and the weight was recorded in kilograms. The skin, carcass color and abdominal fat color were under observation. Abdominal fats of broiler belonging to the different treatments were compared with other.

Sensory Evaluation

From each treatment, one kilo of meat, abstained from thigh and breast was cooked for the sensory evaluation. The meat samples were cooked separately or by treatment but using the same kind of casserole and the same amount of water which was four cups each. Cooking was done for 45 minutes.

When cooked, the meat samples were sliced into bite sizes afterwards, these were given codes and presented to the panel of tasters. Each member of the panel tasters was given a score or evaluation sheet for him to place his rating. Each member also was requested to drink water rinse his mouth with water after tasting every sample to wash off any remains of the meat previously eaten that may have affected his rating for the succeeding meat samples.

Data Gathered

The following parameters gathered from the study:

1. Slaughter weight (kg). This was the weight of broiler before slaughter time.

2. Dressed weight (kg) . This refers to the actual weight of slaughtered bird after plucking the feathers with head, feet, and entrails off.

3. Skin color. This was determined by comparing the skin to the yolk color fan.

4. Carcass color. This was done by observation of the carcass.

5. Color of abdominal fat. This was obtained by actual observation of the abdominal fats and comparing it to the yolk color fan.

6. Dressing percentage (%). This was obtained by dividing the carcass weight by the slaughter weight multiplied by 100%.

7. Meat color, tenderness, juiciness, taste, aroma and acceptability. This was obtained through organoleptic test involving a panel of testers composed of 10 teachers, 10 students from the College of Home Economics and Technology (CHET).

Data Analysis

All the data gathered were tabulated and analyzed using the analysis of variance for completely Randomized Design. Treatment means were compared using the Duncan's Multiple Range Test (DMRT).

## RESULTS AND DISCUSSION

### Slaughter Weight and Dressed Weight

Table 1 presents the slaughter and dressed weights of the birds in the different treatments. Statistical analysis showed that there were no significant differences in the slaughter weight of the birds among treatment means.

This is expected because the broilers were purposely selected to have more or less similar weights at slaughter. This was done to eliminate the possible effect of slaughter weight, because the broilers were almost of the same weights at slaughters, it followed that their dresses weights were or less similar also. The overall mean slaughter weight of the broilers used in the study was 1.56 kg and the dressed weight was 1.17 kg.

Table 1. Slaughter and dressed weights of the birds in the different treatments (kg)

| TREATMENT | SLAUGHTER WEIGHT (kg) | DRESSED WEIGHT (kg) |
|---|---|---|
| Pure commercial feeds | 1.553[a] | 1.139[a] |
| 500g CF + 400gCorn grits + 100g sweet potato | 1.557[a] | 1.219[a] |
| 500g CF + 300g Corn grits + 200g sweet potato | 1.550[a] | 1.196[a] |
| 500g CF + 200gCorn grits + 300g sweet potato | 1.560[a] | 1.328[a] |

Means with the same superscript are not significantly different at 0.05 level, DMRT

Dressing Percentage

Statistical analysis revealed that there were no significant differences among treatments in terms of dressing percentage. As shown in Table 2, dressing recovery from the birds regardless of treatment was comparable. This shows that using different levels of sweet potato and corn grits to substitute 50% of the commercial feeds given to the birds did not affect their dressing percentage.

Color of Skin, Carcass, and Abdominal Fat

After dressing, the carcasses were displayed on the table and observed for skin color. The skin of the carcasses was more or less of the same color of pale yellow (Fig.1). This means that the different levels of sweet potato and corn grits did not cause any variation in skin color of the broilers (Fig.2).

The carcasses of the broilers from the different treatments had similar color which was pinkish-red. This means also that the different levels of sweet potato and corn grits did not affect the carcass color of broilers (Fig.3).

The abdominal fats collected from the broilers were similarly light-yellow in color or number one in the yolk color fan. This means that the different levels of sweet potato and corn grits has no effect on the color of abdominal fats in broilers.

Table 2. Dressing percentage of the birds in the different treatments (%)

| TREATMENT | DRESSING PERCENTAGE |
|---|---|
| Pure commercial feeds | 73.34[a] |
| 500g CF + 400gCorn grits + 100g sweet potato | 75.80[a] |
| 500g CF + 300g Corn grits + 200g sweet potato | 75.74[a] |
| 500g CF + 200gCorn grits + 300g sweet potato | 76.70[a] |

Means with the same superscript are not significantly different at 0.05 level, DMRT


Figure 1. Sample color of the skin of one of the dressed broilers

Figure 2. Carcass color of broiler meat in the different treatments

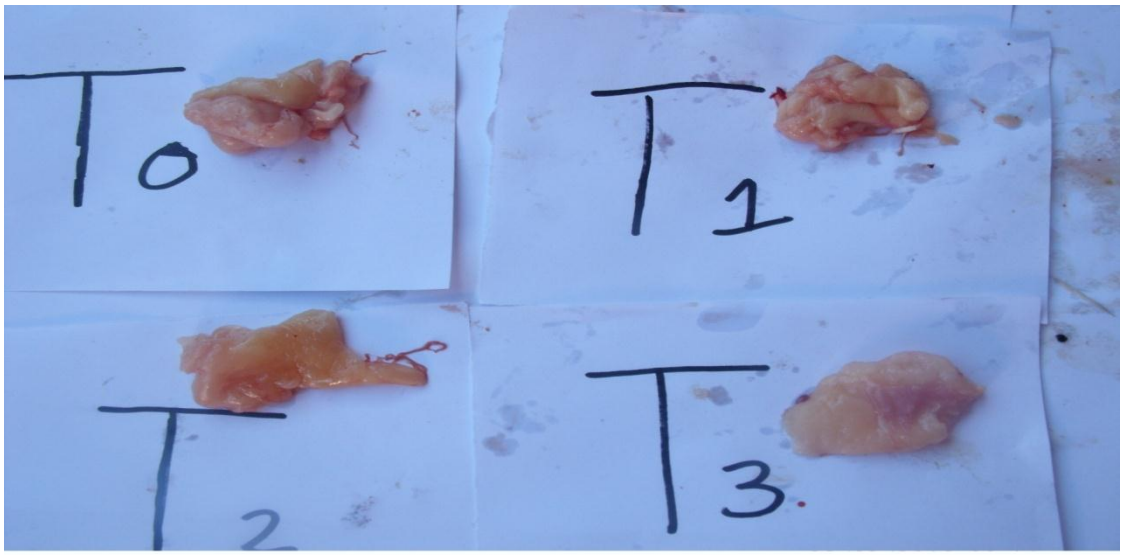

Figure 3. Abdominal fats of broiler in the different treatments

Sensory Traits of the Carcass

Appearance. Table 3 shows the ratings for the appearance of the cooked meat in the different treatments which ranged from 1.62 to 1.75 with a verbal rating of moderately desirable. Statistical analysis revealed no significant differences between treatment means. The results imply that corn grits and sweet potato did not produce any coloring effect to the meat.

Aroma. Statistical analysis revealed that there were no significant differences among treatments in terms of aroma (Table 4). The meat in all the treatments had a mean rating of 1.72 and were all liked moderately by the panel of tasters. The result also implies that the sweet potato and corn grits used to substitute 50% of the commercial feeds given to the broilers did not cause special aroma to the meat of the broilers.

Table 3. Appearance of the cooked meat as rated by the panel of tasters

| TREATMENT | MEAN | VERBAL RATING |
|---|---|---|
| Pure commercial feeds | 1.62[a] | Moderately Desirable |
| 500g CF + 400gCorn grits + 100g sweet potato | 1.75[a] | Moderately Desirable |
| 500g CF + 300g Corn grits + 200g sweet potato | 1.72[a] | Moderately Desirable |
| 500g CF + 200gCorn grits + 300g sweet potato | 1.75[a] | Moderately Desirable |

Means with the same superscript are not significantly different at 0.05 level, DMRT

Tenderness. For the tenderness of the meat samples, there were no significant differences among treatment means as revealed by statistical analysis (Table 5). The numerical rating ranges from 1.71 to 2.067 with a verbal rating of very tender. This reveals that the tenderness of the meat samples derived from the birds in the different treatments was more or less the same.

Juiciness. Table 6 shows the juiciness of the meat samples with a numerical rating of 1.50 to 2.49. Statistical analysis revealed that there were no significant differences among treatment means. This means that the meat in all the treatments were more or less the same in juiciness. In fact, this were all rated to be moderately juicy.

Taste of the product. The numerical ratings for taste of the meat in the different treatments are shown Table 7. Statistical analysis showed that there were no significant differences among treatments. This implies that the corn grits and sweet potato had no effect on the taste of the product. The meat in all the treatments were liked moderately by the panel of tasters.

Table 4. Aroma of the cooked meat as rated by the panel of tasters

| TREATMENT | MEAN | VERBAL RATING |
|---|---|---|
| Pure commercial feeds | 1.717[a] | Like Moderately |
| 500g CF + 400gCorn grits + 100g sweet potato | 1.700[a] | Like Moderately |
| 500g CF + 300g Corn grits + 200g sweet potato | 1.767[a] | Like Moderately |
| 500g CF + 200gCorn grits + 300g sweet potato | 1.683[a] | Like Moderately |

Means with the same superscript are not significantly different at 0.05 level, DMRT

Table 5. Tenderness of the cooked meat as rated by the panel of tasters

| TREATMENT | MEAN | VERBAL RATING |
|---|---|---|
| Pure commercial feeds | 1.867[a] | Very Tender |
| 500g CF + 400gCorn grits + 100g sweet potato | 2.067[a] | Very Tender |
| 500g CF + 300g Corn grits + 200g sweet potato | 1.717[a] | Very Tender |
| 500g CF + 200gCorn grits + 300g sweet potato | 1.867[a] | Very Tender |

Means with the same superscript are not significantly different at 0.05 level, DMRT

Table 6. Juiciness of the cooked meat as rated by the panel of tasters

| TREATMENT | MEAN | VERBAL RATING |
|---|---|---|
| Pure commercial feeds | 2.133[a] | Moderately Juicy |
| 500g CF + 400gCorn grits + 100g sweet potato | 2.033[a] | Moderately Juicy |
| 500g CF + 300g Corn grits + 200g sweet potato | 2.017[a] | Moderately Juicy |
| 500g CF + 200gCorn grits + 300g sweet potato | 1.867[a] | Moderately Juicy |

Means with the same superscript are not significantly different at 0.05 level, DMRT

Acceptability. Statistical analysis revealed that there were no significant differences among the treatment means in terms of acceptability of the meat. This means that regardless of what the broilers eat the tasters liked all the meat samples moderately.

Table 7. Taste of the cooked meat as rated by the panel of tasters

| TREATMENT | MEAN | VERBAL RATING |
|---|---|---|
| Pure commercial feeds | 1.950[a] | Like Moderately |
| 500g CF + 400gCorn grits + 100g sweet potato | 1.867[a] | Like Moderately |
| 500g CF + 300g Corn grits + 200g sweet potato | 1.950[a] | Like Moderately |
| 500g CF + 200gCorn grits + 300g sweet potato | 1.700[a] | Like Moderately |

Means with the same superscript are not significantly different at 0.05 level, DMRT

Table 8.Acceptability of the cooked meat as rated by the panel of tasters

| TREATMENT | MEAN | VERBAL RATING |
|---|---|---|
| Pure commercial feeds | 2.000[a] | Like Moderately |
| 500g CF + 400gCorn grits + 100g sweet potato | 1.817[a] | Like Moderately |
| 500g CF + 300g Corn grits + 200g sweet potato | 1.850[a] | Like Moderately |
| 500g CF + 200gCorn grits + 300g sweet potato | 2.017[a] | Like Moderately |

Means with the same superscript are not significantly different at 0.05 level, DMRT

# SUMMARY, CONCLUSION AND RECOMMENDATION

## Summary

This study was conducted to evaluate the meat of broilers fed with different levels of sweet potato and corn grits. The carcass evaluation and the organoleptic test was done at the Department of Animal Science Meat Laboratory on February 2011.

Specifically, the study aimed to find the effect of sweet potato and corn grits on the meat in terms of appearance, aroma, tenderness, juiciness, taste and acceptability of the birds. It also aimed to determine the level of sweet potato and corn grits that will give the best carcass characteristics.

One hundred sixty day old chicks were subjected to four treatments for 45 days namely; $T_o$- pure commercial feeds; $T_1$- 50% commercial feeds + 40% corn grits and 10% sweet potato; $T_2$- 50% commercial feeds + 30% corn grits and 20% sweet potato;$T_3$- 50% commercial feeds + 20% corn grits and 30% sweet potato. After the feeding period, one bird per replication from each treatment was slaughtered for carcass evaluation. The breast and thigh muscles from the carcass were cooked in the same amount of water at the same time and prepared for the taste testing.

Similarly, statistical analysis revealed no significant differences among treatments in terms of appearance, aroma, tenderness, taste and acceptability of the broiler meat.

## Conclusion

It is therefore concluded that the different levels of corn grits and sweet potato as feed substitute to commercial feeds of corn grits and sweet potato did not cause any variations on the carcass parameters measured in this study.

## Recommendation

It is recommended that the combination of corn grits and sweet potato maybe used as substituted for commercial feed too.

# LITERATURE CITED


ANONYMOUS, 2010.Sweetpotatoes.Retieved October 2010 from http://www.whfoods.com/ genpage.php?tname=foodspicedbid=64.

ANONYMOUS. 2007. Sweet potatoes Retrieved October 2010 from http://en.wikipedia.org/wiki/Potato%2C_sweet.

COMA, V. 2000.Feeding Guidelines for Meat and Pig Process 16. Carcass yield and quality of cob and Hubbard Broilers Fed with varying levels of okra . P. 5.

PARIS, G. 1998. Correlation analysis between live weight and some related dressed carcass and turkey. BS Thesis Benguet State University, La Trinidad, Benguet. P.5.

PERRY, T. W., E. CULLISON, R. S. LOWREY. 2000. Feeds and Feeding . 5th Ed. Pearson Education AsiaPte Ltd, Singapore. P. 346.

VILLAREAL, R. L,. T. D. GRIGGS, 1982. Sweetpotato: Proceedings of the First International Symposium. Hon Wen Printing Works. Tainan. P. 79.

WOOLFE, J. A. 1992. Sweetpoato: An Untapped Feed Resource. University Press, Cambridge, United Kingdom.Retrieved October 2010 from http://www.Irrd.org/Irrd15/1//maph151.htm.